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A NEW RACE OF *BUFO VALLICEPS* FROM
GUATEMALA

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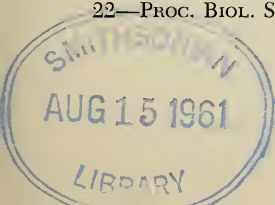
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Through a grant provided by the Horace H. Rackham School of Graduate Studies, The University of Michigan, the junior author was able to spend the winter, spring and early summer of 1955 investigating the herpetofauna of the Sierra de los Cuchumatanes of northwestern Guatemala. Extremely dry conditions prevailed throughout this region that year, and the rains, normally anticipated in mid-May, did not break until early June and even these amounted to no more than scattered showers. As a result few amphibians were secured. The junior author was fortunate, however, to be on hand for several showers that fell upon the village of Jacaltenango during the first week of June.

Jacaltenango lies on a terrace of sandstone, high above the Rio Azul, and small depressions in the bed-rock fill rapidly and retain water for a considerable period after showers. In these shallow rain-ponds within the village were encountered breeding choruses of *Smilisca baudini* Dumerit and Bibron, 1841, *Hypopachus championi* Stuart, 1940, and an apparently undescribed race of *Bufo valliceps* Weigmann, 1833. This last it is now our pleasure to describe and to dedicate to our good friend Leonard S. Wilson, Chief, Environmental Sciences Division, O/C R and D, Department of the Army. The new race may be known as

Bufo valliceps wilsoni, new subspecies

Holotype: The University of Michigan, Museum of Zoology 119391. An adult male collected in a rain-pond in Jacaltenango (ca. 50 air-line



kilometers northwest of Huehuetenango), Huehuetenango, Guatemala on the night of 6 June 1955. Elevation, ca. 1525 meters. Collector, L. C. Stuart.

Paratopotypes: The University of Michigan, Museum of Zoology, 119354-390, 119392, 23 ♂♂ and 15 ♀♀. Collected by L. C. Stuart from rain-ponds in and around Jacaltenango 6-10 June 1955.

Diagnosis: A *Bufo* of the *valliceps* complex distinguished from other populations of the same by its larger and more ovoid parotoid glands and its very short, stout supratympanic crests (Figs. 1-2).

Description of holotype: Head with a full complement of dorsal head-crests. Prefrontal and interorbital crests continuous; flaring laterad and caudad; continuous with the postorbital crests in a gentle curve. Parietal crests directed medially and forming a right angle with the postorbitals. Supratympanic crests short and stout (see below); contained in the length of the parotoid gland almost three times and in the length of the head (see below) almost five and one-half times. Preorbital and postorbital ridges evident but not particularly well developed. Snout to about level of nostrils almost vertical in profile. Upper eyelid shorter than parotoid gland but longer than its distance from the end of the snout. Tympanum vertically ovoid; slightly more than half the length of the upper eyelid; strongly overhung by the supratympanic crest. Parotoid glands longitudinally ovoid, more than half as long as the head length (see below) and almost two-thirds as broad as long. Outer palmar pad about 50 per cent larger than inner. Outer metatarsal tubercle about twice the size of the inner. Toes moderately webbed; toe V webbed to joint of ultimate-penultimate phalanges. A row of inconspicuous, low tubercles extending posteroventrally from parotoids but not reaching groin. A row of differentiated conical tubercles with melanoid apices along ventral, outer edge of tarsus. Dorsum covered with low warts, large intermixed with small. The larger warts without definite apices but with many small melanoid (gland?) openings which number 15-20 on warts of average size but may amount to as many as 50 on the largest ones. Laterally the warts become more uniform in size and lack both melanoid apices and small melanoid (gland?) openings. Ventrums uniformly covered with small warts each with a melanoid apex. Upper surfaces of arms and legs with somewhat larger warts either with single melanoid apices or occasionally with a few secondary melanoid (gland?) openings. Upper and inner lateral surfaces of fingers I and II supporting dark nuptial pads, while only the inner surface of finger III is similarly darkened as is about one-half of each inner palmar tubercle.

The ground color of the head and dorsum (following fixation in formalin and preservation in spirits) is grayish buff. The dorsal surface of the head is without markings except for dark brown fleckings on the ridges of the cranial crests. On the sides of the head the ground color fades ventrad to cream on the upper lip. The back, owing to the melanoid (gland?) openings, has a speckled appearance. A suggestion of a narrow, light mid-dorsal stripe. A poorly defined light streak borders the lateral

line of warts above and a diffused dark streak forms a lower border. Groin region cream-colored and mottled with gray and black. Upper surfaces of arms and legs cream-colored with irregular, transverse bands of gray or black. Undersurfaces cream-colored with very faint gray mottlings. Parotoids light greenish yellow punctated with tiny, dark brown (gland?) openings.

Head-body length, 63.0 mm; head length (base of parietal crest to tip of snout), 18.3 mm; head width (at jaw angles), 23.0 mm; upper eyelid, 9.1 mm; supratympanic crest (outside length), 3.4 mm; long diameter of tympanum, 4.8 mm; right parotoid gland, 10.1 mm by 6.4 mm; leg (coccyx to distal end of tibia), 45.0 mm; foot (distal end of tibia to tip of toe IV), 36.0 mm.

Variation: Table 1 summarizes variations observed in several populations of *valliceps* with reference to the diagnostic features of *wilsoni*. Comparisons have been confined to males inasmuch as females in the collections studied are too few to permit valid conclusions. It may be noted, however, that females of the paratypic series differ from the males only in having slightly longer supratympanic crests, but this difference is so slight that the figures for the type series as indicated by the males are not appreciably affected. Though the senior author has analyzed these data statistically, they reveal nothing of diagnostic value that is not apparent in the raw data.

In color and pattern the paratypic series shows considerable variation. Except for the banding on the extremities, all markings may be obliterated owing either to an over-all lightening or to darkening of the ground color which may vary from light brownish cream to very dark brown respectively. The females tend to be much darker than the males. Some individuals are particularly brilliantly marked with dark brown or black blotchings, mottling or reticulations on a light background. This is especially true of the population from the Tuxtla Gutierrez region (Tuxtla Gutierrez and Berriozabal, Chiapas, Mexico). Our colleague, William Duellman, who sampled the latter, informs us that in life these individuals have a light, greenish yellow dorsum with olive markings.

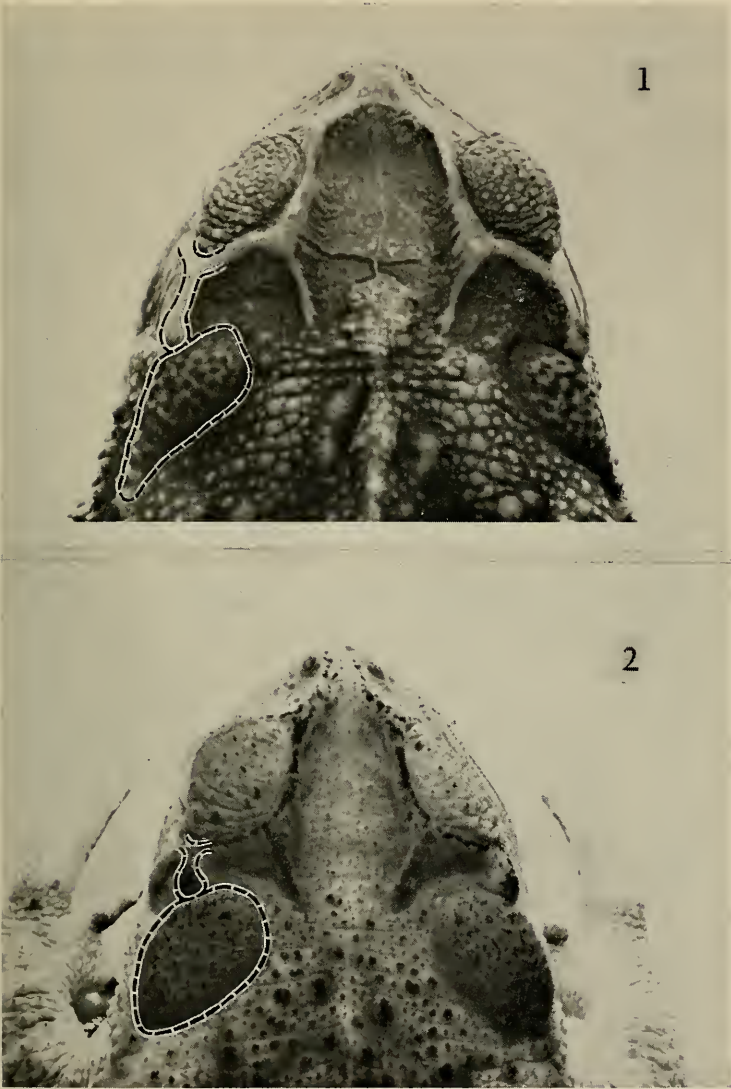
In size, the apparent adults of the paratypic series (males with nuptial pads) vary in head-body length 49.0–64.0 mm in the males and 62.0–76.5 mm in the females. A small male with a head-body length of 41.5 mm displays an early stage of nuptial pad development. Males of the population from the Tuxtla Gutierrez region vary 53.5–69.5 mm head-body length. The largest male I have examined, a specimen from Monte Cristo near Motocintla, Chiapas, Mexico measures 71.5 mm while the largest female, one of what I believe to be an intergrading population between *valliceps* and *wilsoni* from the Monserrat area (ca. 80 kilometers southwest of Ocozocoautla, Chiapas, Mexico), has a head-body length of 93.0 mm.

In addition to the characters analyzed above, the nature of the warts in the differentiated lateral row and the length of the parotoid in relation to the length of the upper eyelid are of some diagnostic value. As

generalizations, the lateral row of warts is far less conspicuous and somewhat more broken and shorter in *wilsoni* than in *valliceps*, and the parotoid of the new race tends to be longer than the upper eyelid whereas in *valliceps* it is generally shorter.

Discussion: In a recent paper (*Herpetologica* 13: 219-221, 1957) Firschein and Smith described *Bufo valliceps macrocristatus* as a population distributed through the foothill region of northern Chiapas, eastern Oaxaca and possibly extreme southern Veracruz, Mexico. Through the courtesy of Hobart Smith the junior author has been privileged to examine the following specimens assigned to that race: two paratopotypes (University of Illinois, Museum of Natural History 11309 and 11311, Palenque, Chiapas), a paratype (UIMNH 35586, La Gloria, near Juchitan, Oaxaca) and a specimen from Cerro Brujo, Chiapas (UIMNH 35764). None of these specimens is in a particularly good state of preservation. All appear to have suffered from desiccation and/or strong formalin fixation. The major diagnostic feature of *macrocristatus* is the extreme hypertrophy of the cranial crests. Other characters include the smaller size of the tympanum which frequently varies with sex and the darker pigmentation of the belly which varies both with size and environment.

Of the paratopotypes UIMNH 11309 appears to me to be typical *valliceps*. Such hypertrophy of the cranial crests as is evident is apparently an artifact caused by tissue shrinkage in the preparotoid region. The second paratopotype, UIMNH 11311, is a moderate-sized female with well hypertrophied crests, an apparent but not necessarily real condition which may also have resulted from preservation. The La Gloria individual is very poorly preserved but does show extreme hypertrophy of the crests. However all three of these paratypes are females and hypertrophy of the crests in large females of *valliceps* is the usual rather than the unusual situation. In fact, allowing for preservation, we do not believe that the hypertrophy exhibited in the above paratypes exceeds to any degree that observed in large, well-preserved *wilsoni* females from the Motocintla region of Chiapas and *valliceps* females from Nicaragua. The Nicaraguan population of *valliceps*, in fact, is characterized by considerable crest hypertrophy. The Cerro Brujo specimen (we assume this to be the well-known plant collecting locality to the south of Ocozacoatlá) is a male, and on the basis of parotoid gland and supratympanic crest measurements seems to be close to *wilsoni*. Its locale lies within the area in which *valliceps-wilsoni* intergradation is suggested (see below). In spite of the skepticism with which we view the validity of *macrocristatus* we hesitate to pass judgment on it until more and better materials have been forthcoming. It may be noted, however, that a well-preserved collection of *valliceps* which has recently been secured in the Teapa region of Tabasco, where environmental conditions appear to be identical with those of Palenque, show no approach to the *macrocristatus* condition. Regardless of the status of *macrocristatus*, it is not, on the basis of the paratypes which have been examined, to be confused with *wilsoni*.



FIGS. 1-2. Surface of heads of two races of *Bufo valliceps* contrasting the narrow, elongate parotoid and elongate supratympanic crest of *Bufo valliceps valliceps* with the more ovoid parotoid and short, stout supratympanic crest of *Bufo valliceps wilsoni*. 1.—*Bufo valliceps valliceps*, Museum of Zoology, University of Michigan, No. 70396; Uaxactun, El Peten, Guatemala. 2.—*Bufo valliceps wilsoni*, holotype.

From Chiapas and northwestern Guatemala we have had access to a few individuals which have not been included in the above analysis. These include ten specimens, mostly females, from the Motocintla region (Mazapa, Monte Cristo, Chicomuselo, and Porvenir), three adults from the Monserrat region, a single individual from Bochil (northwest of San Cristobal), three from Comitán and a single female from San Pedro Necta (ca. 50 air-line kilometers north and slightly west of Huehuetenango, Guatemala). Of these, the Motocintla and San Pedro specimens are typical *wilsoni*, the Bochil and Comitán individuals apparently *valliceps*, while the Monserrat material may be regarded as *valliceps-wilsoni* intergrades though somewhat close to the latter. The range of this new race may, therefore, be defined as the upper valley of the Rio Grijalva in Chiapas and its headwater valleys in northwestern Guatemala at elevations between 400 and 1,600 meters. In other words, the race appears to be restricted to the western end of the northern Central American subhumid corridor which the junior author has described previously (Contrib. Lab. Vert. Biol., Univ. Michigan, 65, 1954).

In this same corridor to the east of Huehuetenango the *valliceps* complex is replaced by the *coccifer* complex. At Aguacatan the junior author found *ibarraí*, and this has been traced eastward and southward through the Salama Basin and the Sierra de las Minas to southeastern Guatemala where it is replaced at elevations below about 160 meters by *coccifer*. With one exception there has been found in Guatemala no sympatry between the *coccifer* and *valliceps* groups. The single exception was the occurrence of a few individuals of *valliceps* in the little plaza in Esquipulas in southeastern Guatemala. Inasmuch as *coccifer* alone occurred, and in abundance, on the grasslands immediately around Esquipulas, it is conceivable that the few *valliceps* observed within the village may have stemmed from an importation. Esquipulas, it may be noted, is the most important religious shrine in northern Central America where it holds a position comparable to that of Guadalupe in Mexico.

Inasmuch as *ibarraí* and *wilsoni* are superficially very similar in appearance, it may be pointed out at this time that the *coccifer* and *valliceps* groups may be separated easily on the basis of two characters. The snout of *valliceps* is almost vertical in profile and forms a rounded but distinct angle with the surface of the head. In *coccifer* the dorsal surface of the head and the tip of the snout are continuous, forming an uninterrupted arc in profile. A second character is found in the structure of the larger warts of the dorsum and flanks. In the *coccifer* series, even in adult breeding males, the warts are cone-shaped and generally have sharply pointed, melanoid apices. In *valliceps* the warts are more flattened and may or may not support melanoid apices. The warts in the *valliceps* group are covered with melanoid secondary spinules which in the holotypic description of *wilsoni* were defined as possible multiple gland openings. In females, warts of this nature are more localized than in the males and are frequently confined to the anterior parts of the flanks. The difference in the nature of the warts parallels the condition

TABLE 1.—Summary of Analyses of Three Characters in Several Populations of *Bufo valliceps*.^o

LOCALITY	PAROTOID GLAND		HEAD LENGTH		HEAD LENGTH	
	SUPRATYMPANIC CREST		PAROTOID GLAND		SUPRATYMPANIC CREST	
Jacaltenango (20)	2.4-4.0 (3.0)	90% > 2.6	1.6-2.1 (1.9)	90% < 2.0	4.7-6.9 (5.5)	90% > 4.8
Tuxtla Gutierrez (25)	2.2-3.8 (2.9)	90% > 2.6	1.7-2.2 (1.9)	90% < 2.0	4.4-7.2 (5.5)	90% > 4.6
Totals (45)	2.2-4.0 (2.9)		1.6-2.2 (1.9)		4.4-7.2 (5.5)	
	90% > 2.6 (3.0)		90% < 2.0 (1.9)		90% > 4.7 (5.6)	
	80% > 2.6 (3.0)		80% < 2.0 (1.9)		80% > 5.1 (5.8)	
Tabasco (15)	1.8-2.5 (2.2)	90% < 2.4	1.8-2.3 (2.1)	90% > 2.0	4.0-5.5 (4.6)	90% < 4.8
El Peten (15)	1.4-2.0 (1.8)	90% < 2.0	2.0-2.8 (2.2)	90% > 2.0	3.0-4.6 (3.8)	90% < 4.1
Southern Veracruz (15)	1.7-2.6 (2.1)	90% < 2.3	1.9-2.5 (2.1)	90% > 1.9	4.0-4.9 (4.4)	90% < 4.6
Tamaulipas (13)	1.7-2.5 (2.1)	90% < 2.3	1.8-2.5 (2.2)	90% > 2.0	3.5-5.0 (4.5)	90% < 4.8
Southern Guatemala (9)	1.5-2.5 (2.0)	90% < 2.2	2.0-2.8 (2.4)	90% > 2.2	4.1-5.4 (4.7)	90% < 5.3
Nicaragua (5)	1.8-2.4 (2.1)	90% < 2.4	1.8-2.5 (2.2)	90% > 1.8	4.0-5.0 (4.4)	90% < 5.0
Totals (72)	1.4-2.6 (2.1)		1.8-2.8 (2.2)		3.0-5.5 (4.4)	
	90% < 2.4 (2.0)		90% > 2.0 (2.2)		90% < 4.8 (4.3)	
	80% < 2.3 (2.0)		80% > 2.0 (2.2)		80% < 4.7 (4.2)	

^o In the above table are listed the extremes and means (in parentheses) of the several characters utilized in the diagnosis of *Bufo valliceps wilsoni* as observed in samples of males of various populations. The 80 and 90 per cent levels may vary several percentage points above or below the stated levels. Figures in parentheses following the localities indicate the number of individuals examined.

observed in *Bufo regularis* and *Bufo funereus* by Inger and Greenberg (Journ. Morph. 99(3): Figs. 6-9, 1956). The *valliceps* type is shown by Fig. 9 and the *coccifer* type by Fig. 6 and Fig. 8 (in part).

In singling out the Grijalva Valley population as distinct from other populations of *valliceps*, we do not mean to imply that all material from Tamaulipas to Nicaragua utilized in comparisons is conspecific. We mean, rather, that, with reference to the characters examined, the Grijalva Valley population differs from all others of the *valliceps* complex. We would even suggest that the Yucatan (and northern Guatemala) populations will probably have to be separated nomenclaturally from the populations of Veracruz and the Gulf Coastal Plain to the north. The same is indicated for more southern populations.

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